

REMARKS

Claims 39-71 were pending at the time of the present action. Claims 58, 66 and 71 are cancelled herein, without prejudice. The remaining claims are amended above to address the objections and rejections in the pending office action. No new matter is added by the amendments.

The present action indicates that references listed in the application have not been considered, unless presented in a separate information disclosure statement. A supplemental IDS is provided herewith, indentifying references that appear to have not yet been formally considered. These references are identified in the PCT prosecution and in the application text as filed. Consideration of these references, along with the PCT prosecution documents, is respectfully requested.

In the Office Action, claims 42-54, 58-66 and 70-71 are identified as being objected to as being multiple-multiple dependant claims. The amendments above address and obviate this objection.

Claims 39-41 stand rejected as being anticipated by Bothwell US 3,447,163. Claims 42-54 stand rejected based on obviousness in view of Bothwell and Dunn US 5,349,893. It is respectfully submitted that the claims as amended are not disclosed or suggested by these cited references.

It is asserted in the Action that Bothwell includes an array of "energy absorbing shells 18" comprising a tube ...". However, Bothwell does not disclose a plurality of discrete cell tubes each having side walls that are in contact and supported by the side walls of another discrete tube structure as is claimed. Bothwell does not use the word "shells" in its text, but defines the item labeled 18 as a "honeycomb material" (column 2, line 44) or a "honeycomb layer" (column 2, line 62, etc.). The material shown in Figs. 1, 4 and 5 of Bothwell is clearly of a honeycomb. A honeycomb structure does not include discrete tubes. The honeycomb cells are interconnected to form a lattice, such that each of the six side walls of the honeycomb elements are shared with the neighboring honeycomb elements. Thus, the Bothwell structure is not formed by independent or discrete tubular elements, as claimed.

In addition to the tubes in the present claims being discrete elements, these tubes extend between the outer and inner surfaces of the formed panel. Further, these tubes have an axis that is substantially orthogonal to the panel surfaces. In Bothwell, (column 2, lines 49-50, and

column 3, lines 1-5) one end of the honeycomb cells are spaced from the inner surface of either the outer shell 12 or the inner shell 13. This is specifically shown in Figs. 2, 3 and 6.¹

The citation of Dunn does not resolve the deficiencies in Bothwell. Dunn also shows a honeycomb structure wherein the lattice within panel 15 defines the integral sidewalls. In the pending action, Dunn is cited for teaching the use of welding or adhesives for purposes of strengthening a honeycomb structure. Dunn does not suggest or disclose discrete tubular structures for forming the cells. The adhesives in Dunn are applied to form the walls of the honeycomb lattice. The adhesives are not applied to the sidewalls of discrete tubular cells. As such, Dunn does not disclose or suggest the specifically claimed combination of an array of discrete tubular cells having discrete side walls that are then connected by means of an adhesive.

For the above reasons, it is respectfully submitted that claims 39-54, as amended, are not disclosed or suggested by the references cited in the present Office Action. The pending claims are not anticipated or rendered obvious by these references and these claims are in condition for allowance.

Claims 55-56 stand rejected as anticipated in view of Tsotsis US 5,518,796. In addition, Claims 57-71 stand rejected as being obvious in view of Tsotsis. It is respectfully submitted that these claims as amended are not disclosed or suggested by this Tsotsis reference.

Independent claims 55 and 67 are amended to define the protective device as being wearable by a user and as having a curvature. The structures claimed are subject to a thermoforming method for applying the curvature therein. Within the assembly process, the first and second materials are allowed to move relative to one another during heating. This movement is a function of the relative melting temperatures of the materials and the associated adhesive used to bond the materials.

It is noted that there is no curvature in structures in Tsotsis. The Tsotsis reference describes a planer flooring structure formed with a central honeycomb lattice. The bonding of the honeycomb core in Tsotsis is simply a matter of using a known resin with the top and bottom

¹ The structure shown in Fig. 4 aligns the honeycomb structures at an angle with respect to the inner surface 13 and is not intended to show a connection between the surfaces 12, 13. (See column 3, lines 31-35.)

skins and allowing the adhesive to cure. There is no further discussion on the specifics of the bonding process.

There is no discussion in Tsotsis of the features of the present claims, wherein the adhesive is melted to allow movement between the materials. Tsotsis does not disclose or suggest any relative movement of the parts. Further, the claims define the first material as having an array of energy absorbing cells, with each cell comprising a discrete tube. Moreover, Tsotsis is void of any discussion of a movement of the material parts as a function of the relative melting temperatures of the materials and the adhesive.

It is argued in the present Action that the concept of using an adhesive having a melt temperature lower than the melt temperature of the materials to be bonded is known, such as in hot melt adhesive technology. However, the specifics of the claims are much greater than common adhesives. It is agreed that many adhesives exist and that some have a lower melt temperature than the materials to be joined. It would not have been obvious to use such a property to enable two materials to slide relative to one another during thermoforming to create a curvature within the article.

The details of the present claim language is particularly limited to enabling a fairly specific first material to be able to slide along the surface of a plastics material to permit a curvature to be formed within particular body protecting device. Honeycomb structures are suitable for applications involving flat panels or structures having only a relatively small curvature. Problems arise when such materials are used in items having a large curvature. Hexagonal honeycomb structures are altered by the introduction of curvature, affecting the orientation of the honeycombs (and so affecting disadvantageously the subsequent energy absorbance of the overall structure). In the present claims, the cell structure is an array of discrete tubular members, which differs from a honeycomb lattice. Moreover, the use of adhesives having a melt temperature lower than that of the materials joined was not previously considered in the formation of curved safety devices. Such adhesive use was not, therefore, within the realm of general knowledge in the manufacture of body protecting devices.

The present claims involve the use of a first material having an array of energy absorbing cells, with each cell comprising a tube. By using discrete tubes in an array, not only are the energy absorbance limitations of the lattice of a honeycomb structure overcome, there is also no significant detriment to or reduction in energy absorbance of the first material because of further

forming steps. The only requirement is that the first and second materials still have sufficient structure at the thermoforming temperature where the adhesive there between is able to melt and so adhere. The slippage or movement between the first and second materials allows the body protective device to be formed without affecting the property of the energy absorbance of the first material in the final product.

The solution of the present claims is not the finding or creating of the adhesives; it was the resolution of the problems associated with the disorientation of the structures, such as a honeycomb, during formation of body protective devices. As such, the mere reference to known adhesives does not suggest the specific features of the claimed invention.

It is respectfully submitted that none of the claims as amended are suggested or disclosed by the cited references and that the all of the claims are in condition for allowance. A notice of allowance is respectfully requested.

If any additional minor issues remain that can be resolved by a telephone call, the Examiner is invited to contact the Applicants' representative to expedite the allowance of the application.

Respectfully submitted,

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February 16, 2011
(Date)



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